

1 **Claims:**

2 What we claim is:

- 3 1. A user interface for volume sculpting comprising:
4 a processor;
5 a two-dimensional input device operably connected to the processor; and
6 a display device operably connected to the processor and wherein the
7 processor operates to provide on the display device a first view of a sculpting
8 object and a second view of the object, the first view of the object providing a full,
9 six-degree-of-freedom orientation control of the view.
10 2. The user interface of claim 1, wherein the first view comprises a cross-sectional
11 area of the object.
12 3. The user interface of claim 1, wherein the second view is fixed in orientation in
13 relation to the first view.
14 4. The user interface of claim 3, wherein the second view is fixed in position in
15 relation to the first view.
16 5. The user interface of claim 3, wherein the second view is orthogonal to the first
17 view.
18 6. A method of forming a model of a three-dimensional object comprising:
19 generating a three-dimensional set of points;
20 grouping the points into a plurality of three-dimensional cells;
21 subdividing a cell in the plurality of cells into multiple subdivisions;
22 locating adjacent cells that contact the subdivisions; and
23 subdividing the adjacent cells to eliminate dangling points.
24 7. The method of claim 6, wherein the generating step comprises generating a set of
25 voxels as the set of points.
26 8. The method of claim 6, wherein the grouping step comprises grouping the points
27 into cubic cells.
28 9. The method of claim 6, wherein the subdividing the cell step comprises forming
29 eight subdivisions.
30 10. The method of claim 6, wherein the subdividing the cell step comprises forming
31 twelve subdivisions.
32 11. The method of claim 6, wherein the subdividing the adjacent cells is performed
33 automatically.

- 1 12. The method of claim 6, wherein the subdividing the adjacent cells comprises
2 adding only one point per adjacent cell.
- 3 13. The method of claim 6, wherein the subdividing the cell comprises forming six
4 pyramids.
- 5 14. The method of claim 13, wherein the subdividing the cell comprises forming
6 twelve tetrahedra from the six pyramids.
- 7 15. The method of claim 6, further comprising removing at least one of the
8 subdivisions from the model.
- 9 16. The method of claim 6, further comprising reproducing at least one of the
10 subdivisions or cells and adding it to the model.
- 11 17. The method of claim 16, further comprising continuing to add subdivisions and
12 cells until a volume defined by the object has been filled.
- 13 18. The method of claim 17, further comprising selectively subdividing cells that are
14 outside of the volume.
- 15 19. The method of claim 18, further comprising removing portions of the cells that
16 have been subdivided.
- 17 20. The method of claim 6, further comprising assigning color values to the set of
18 points.